

REMARKS

Claims 1-5 and 8-16, and 18-22 are pending in this application. Of those claims, claims 8-10, 12-14 and 18-22 have been withdrawn from consideration pursuant to the provisions of 37 C.F.R. §1.142(b).

In this Amendment, claims 1 and 15 have been amended, claims 8-10, 12-14, and 18-22 canceled, without prejudice, reserving right to prosecution in a continuation application, and new claims 29-35 added. Care has been exercised to avoid the introduction of new matter. Support for the amendments of claims 1 and 15 can be found in, for example, pages 15, line 23 to page 16, line 7; and page 22, lines 4-9 of the specification. New claims 29-35 correspond to claims 1-5, 7, and 11 in the September 26, 2006 Amendment, respectively.

Claims 1-5, 11, 15, 16, and 29-35 are now active in this application, of which claims 1, 15, and 29 are independent.

Information Disclosure Statement

An Information Disclosure Statement was filed January 14, 2008. Applicants respectfully request the Examiner to acknowledge receipt of the IDS when reviewed and provide a copy of the PTO-1449 form appropriately initialed indicating consideration of the cited references.

Claims 1-5, 11, 15, and 16 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Kaneshiro et al. in view of Bergmann et al., and further in view of Matayabas, JR. et al.

The Examiner admitted that Kaneshiro et al. does not explicitly disclose that the projections have 1 nm to 20 nm in average diameter and formed in a number density of not less than $0.5 \times 10^3 \mu\text{m}^{-2}$. However, the Examiner asserted that Bergmann et al. and Matayabas, JR. et al. teach the missing features of Kaneshiro et al., and concluded that it would have been obvious to modify the device of Kaneshiro et al. based on the teachings of Bergmann et al. and Matayabas, Jr. et al. to arrive at the claimed subject matter.

Applicants submit that Kaneshiro et al., Bergmann et al., and Matayabas, Jr. et al., either individually or in combination, do not disclose or suggest a semiconductor module including all the limitations recited in independent claim 1. Specifically, the applied combination does not teach, among other things, the following limitations of claim 1:

wherein said insulating base material is provided with minute projections formed on a surface thereof that is in contact with said insulator by forming projections and recesses on the insulating base material, and

said minute projections include a plurality of projections of 1 nm to 20 nm in average diameter and formed in a number density of not less than $0.5 \times 10^3 \mu\text{m}^{-2}$.

The Examiner assertion regarding the applied combination in the Office Action is as follows (emphasis added):

Therefore, it would have been bogus to one having ordinary in the art at the time the invention was made to modify the device of Kaneshiro et al. by having a plurality of nanoparticles having 10 to 50 nm in average diameter and forming the amount of feelers about 10 to 19 wt % as taught by Bergmann et al. and Matayabas, JR. et al. in order to use for low-viscosity adhesive base compositions and such filler would reduce surface tension and improve adhesion.

Kaneshiro et al. teaches that a surface of solder resist 5A is roughened (see the abstract), and resin sealed body 12 is in contact with solder resist 5A.

Bergmann et al. teaches that nonparticles with a mean diameter of between 10 and 50 nm can be used for low-viscosity adhesive base compositions (see paragraph [0037]), and that adhesive 2 including nanoparticles 7 is used to attach semiconductor chip 10 on ceramic plate 11 (see paragraph [0055] and figure 1).

Matayabas, JR. et al. teaches that thermal interface material 104 is a nanocomposite phase change thermal interface material that includes one or more thermally conducted fillers (see paragraph [0028] and Fig. 1). Thermal interface material 104 is used as an adhesive layer to attach semiconductor device 103 to heat spreader 105 (see paragraph [0028] and Fig. 1). Thermal interface material 108 including the fillers is also used as an adhesive layer to attach heat sink 106 to heat spreader 105 (see paragraph [0029] and Fig. 1).

Accordingly, when the teachings of these references are combined, the semiconductor device of Kaneshiro et al. is modified such that resin sealed body 12 is in contact with solder resist 5A through an adhesive layer including nanoparticles of Bergmann et al. and fillers of Matayabas, JR. et al. Applicants emphasize that the cited references do not teach modifying the roughened surface of solder resist 5A. Rather, the cited references simply teach adding an adhesive layer between resin sealed body 12 and solder resist 5A of Kaneshiro et al. In addition, the Examiner did not provide any reason why the roughened surface of solder resist 5A of Kaneshiro et al. needs to be modified, and did not provide any support for modifying the roughened surface of solder resist 5A of Kaneshiro et al., to arrive at the claimed subject matter. There is no disclosure of suggestion of replacing solder resist 5A of Kaneshiro et al. with an

adhesive taught by Bergmann et al. and Matayabas, JR. et al. to arrive at the claimed subject matter.

Accordingly, the applied combination does not teach the claimed insulating base material provided with minute projections formed on a surface thereof that is in contact with said insulator by forming projections and recesses on the insulating base material, and the minute projections include a plurality of projections of 1 nm to 20 nm in average diameter and formed in a number density of not less than $0.5 \times 10^3 \mu\text{m}^{-2}$, as claimed.

Based on the foregoing, Applicants submit that Kaneshiro et al., Bergmann et al., and Matayabas, JR. et al., either individually or in combination, do not disclose or suggest a semiconductor module including all the limitations recited in independent claim 1. The above discussion is applicable to independent claim 15. Dependent claims 2-5, 11, and 16 are also patentably distinguishable over Kaneshiro et al., Bergmann et al., and Matayabas, JR. et al. at least because the claims include all the limitations recited in independent claim 1 and 15, respectively. Applicants, therefore, respectfully solicit withdrawal of the rejection of the claims and favorable consideration thereof.

New Claims 29-35

Applicants believe that new claims 29-35 are patentable over Kaneshiro et al., Bergmann et al., and Matayabas, JR. et al. for the following supplemental reasons, as well as the reasons discussed above.

Bergmann et al. (US 2006/0017069) is based on the national stage (35 U.S.C. §371) of International Application No. PCT/DE03/00458 filed on February 14, 2003. The International Application was not published in English (see WO03/071596 A2, published in German

language). Accordingly, Bergmann et al. has no 35 U.S.C. §102(e) prior art date, but can be applied as prior art under 35 U.S.C. §102(a) or §102(b) as of its publication date of January 26, 2006. See MPEP 706.02(f)(1) Example 5. Since the filing date of the present application is March 31, 2004 which is earlier than January 26, 2006, Bergmann et al. (US 2006/0017069) cannot be quantified as prior art to the present application.

It is noted that the PCT counterpart (WO03/071596 A2) and the German counterpart (DE 102 06 818 A1) of Bergmann et al. (US 2006/0017069) were published on August 28, 2003, and both counterparts can be applied as prior art to the present application under 35 U.S.C. §102(a). However, the present application has an earliest priority date of March 31, 2003, based on the claim of priority to Japanese Patent Application No. 2003-093324, which supports new claims 29-35. Applicants will submit an English language translation of the priority document in order to perfect the claim of priority. Thus, the PCT counterpart (WO03/071596 A2) and the German counterpart (DE 102 06 818 A1) of Bergmann et al. (US 2006/0017069) cannot be applied as prior art to the claims.

Further, Matayabas, JR. et al. has an effective filing date of March 31, 2003 for the purpose of being utilized as prior art against pending U.S. patent applications under 35 U.S.C. §102(e). As discussed above, the earliest priority date of the present application is March 31, 2003, which is the same as the effective filing date of Matayabas, JR. et al. Therefore, Matayabas, JR. et al. does not meet the requirement under 35 U.S.C. §102(e) (“an application for patent published under section 122(b), by another filed in the United States before the invention by the applicant...”). Thus, Matayabas, JR. et al. cannot be applied as prior art to new claims 29-35.

Since Bergmann et. al. and Matayabas, JR et al. are not prior art to this application, the Examiner's reliance on the proposed combination of Kaneshiro et al. in view of Bergmann et al. and further in view of Matayabas, JR. et al. no longer is acceptable.

Conclusion

It should, therefore, be apparent that the imposed rejections have been overcome and that all pending claims are in condition for immediate allowance. Favorable consideration is, therefore, respectfully solicited.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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